

## ***Interactive comment on “Use of Ra isotopes to deduce rapid transfer of sediment-derived inputs off Kerguelen” by V. Sanial et al.***

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We thank the reviewer for her/ his positive comments on the manuscript.

1/ Cross calibration between the well-type and the semi-planar detectors are frequently done at the underground laboratory to validate the data. We have many data, including KEOPS-2 samples, to testify that.

2/ By considering the uncertainty on the detection efficiencies of  $^{226}\text{Ra}$  and  $^{228}\text{Ra}$ , this increases the overall uncertainty by 1-3% only. This source of uncertainty is thus relatively minor in comparison with the uncertainty associated with counting statistics (which is the main source of uncertainty).

3/corrected

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4/ The different assumptions inherent to Equation 1 (Moore, 2000) are: (1) Single and constant value for the  $^{223}\text{Ra}$  and  $^{224}\text{Ra}$  activities of the source region (that are used to generate the initial  $^{224}\text{Ra}/^{223}\text{Ra}$  ratio) (2) no addition or loss of Ra except for mixing and decay that occur once the water body has left the source region and (3) open ocean waters contain negligible excess  $^{223}\text{Ra}$  or  $^{224}\text{Ra}$  activities

5/ There is a relatively large range of  $^{224}\text{Ra}/^{223}\text{Ra}$  ratios between the samples collected at the beach and waters collected in coastal waters ( $1.50 \pm 0.84$  to  $20.64 \pm 13.83$ ). We did not want to calculate apparent ages using only the ratios of samples collected at the beach as an initial ratio. Therefore, we preferred to average the ratios of samples collected at stations with a bottom depth < 200 m. We used the mean  $^{224}\text{Ra}/^{223}\text{Ra}$  ratio found on the shallow plateau (that reflects the ratio found in shallow waters) as an initial ratio to derive apparent ages.

6/ A reference to the Cai et al., 2012 paper was added in the section 4.2 "Future studies in the area may want to track more precisely the sedimentary sources of Ra (and other chemical elements) and to quantify the Ra fluxes out of the sediments using e.g. the method described by (Cai et al., 2012)"

Cai, P., Shi, X., Moore, W. S. and Dai, M.: Measurement of  $^{224}\text{Ra}:^{228}\text{Th}$  disequilibrium in coastal sediments using a delayed coincidence counter, *Mar. Chem.*, 138–139, 1–6, doi:10.1016/j.marchem.2012.05.004, 2012.

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